BRUHAT BANGALORE MAHANAGARA PALIKE
BYTARAYANPURA DIVISION

Name of Work: Package 2 Consists of 3 Works of Rs.1100.00 Lakhs

1. Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division.
2. Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division.
3. Improvements to roads and drains at Hegdenagar and surrounding area in Ward No 06 Byatarayanapura sub division.

TEST REPORTS

SECOND & PART BILL

TEJUS CONSULTANTS
CONSULTING ENGINEERS AND DESIGNERS
No.58 MIG, 6th Cross, 3rd Main
1st Stage, Basaveshwaranagar
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No.TC/BBMP/BYT-PMC/495/21-22

Date: 03 -01 - 2022

To
The Executive Engineer
Byatarayanapura Division,
NH-7 Road, Bangalore – 560 092

Dear Sir

Sub: Improvements to roads and drains at Kogilu, Agrahara, Hegdenagar and surrounding area in Ward No 05 and 06 Byatarayanapura sub division Package-02

In reference to the above subject, this is to bring to your kind notice that we have scrutinized the **Second and Part bill** submitted by **M/s. Benaka Developers and Projects Pvt Ltd** towards the above said work and arrived at an amount of **1,70,21,439.68 /-(Rupees One Crore Seventy Lakhs Twenty One Thousand Four Hundred and Thirty Nine and Sixty Eight Paise Only)** the work has been completed satisfactorily.

This is for your kind information.

Thank you and assuring you the best of our Services at all the times

TEJUS CONSULTANTS

For Tejus Consultants
(Nischal M)

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BRUHAT BANGALORE MAHANAGARA PALIKE
BYTARAYANPURA DIVISION

Name of Work: Package 2 Consists of 3 Works of Rs.1100.00 Lakhs

1. Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division

TEST REPORTS

SECOND & PART BILL

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TEJUS

Project	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

FLAKINESS AND ELONGATION INDICES (IS 2386, PART 1)

Type of Material	WMM	**Proposed Use**	WMM
Sample Location	Tirumenahalli Main Road	**Date of Sampling**	05-11-2021
		Date of Testing	06-11-2021

Size of aggregate		Flakiness Index		Elongation Index	
Passing through IS sieve, mm	Retained on IS sieve, mm	Total wt. of aggregate retained on sieves (A) gms.	Wt. of aggregate passing from Flakiness gauge (B) gms	Wt. of aggregate retained on Flakiness gauge (C) gms	Wt. of aggregate retained on Elongation gauge after retained on Flakiness gauge(D)gms
63.0	50.0	0	0	0	0
50.0	40.0	0	0	0	0
40.0	31.5	0	0	0	0
31.5	25.0	0	0	0	0
25.0	20.0	0	0	0	0
20.0	16.0	649	75	538	77
16.0	12.5	1132	125	982	110
12.5	10.0	775	59	730	56
10.0	6.3	620	62	544	50
Total		**3176**	**321**	**2794**	**293**

Note: Minimum 200 Pcs should be taken on each fraction of test

Flakiness Index(%):	10.11
Elongation Index(%):	10.49
Combined FI+EL (%)	20.59

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4. The material used in the site satisfied the standard of MORTH's 5th revision and hence can be used in the work.

Consultant's Representative

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TEJUS

Project	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

AGGREGATE IMPACT VALUE (IS: 2386 Part - 4)

Proposed Use	WMM	Date of Sampling	05-11-2021
Sample Location	Tirumenahalli Main Road	Date of Testing	06-11-2021

Sl. No.	Description		Test No. 1	Test No. 2	Test No. 3	Spec Limit (%)
1	Wt. of stone pieces (dry) passing IS Sieve 12.5mm but retained in IS sieve 10mm (gm)	(Wa)	349.00	360.00	336.00	
2	Wt. of the fraction retained in IS sieve 2.36mm after the impact test (gm)	(Wb)	270.00	280.00	261.00	
3	Wt. of the fraction passed in IS sieve 2.36mm after the impact test (gm)	(Wc)	79.00	80.00	75.00	
4	Aggregate Impact Value (%)	(Wc/Wa)*100	22.64	22.22	22.32	
5	Average Aggregate impact value	(%)	22.39			Max - 30 %

Remarks : ✓ Satisfactory / Not Satisfactory

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TEJUS
CONSULTANTS

Name of Work	:	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Client	:	Bruhat Bengaluru Mahanagara Palike
Consultant	:	TEJUS CONSULTANTS, BANGALORE
Contractor	:	M/S Benaka Developers and Projects Pvt Ltd
Date of Testing	:	06-11-2021
Type of Mix	:	WMM
Sample I/D	:	WMM 1

GRADATION FOR WMM
(As per MORT&H 400-11)

Sample Location:	Tirumenahalli Main Road	Date of Sampling:	05-11-2021
		Date of testing:	06-11-2021
Type of material & Purpose:	WMM	Oven Dry Wt.(gms):	10000.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
53	0	0	0.00	100.00	100.00
45	378	370	3.70	96.30	95-100
22.4	1780	2150	21.50	78.50	60-80
11.2	2263	4413	44.13	55.87	40-60
4.75	2025.0	6438	64.38	35.62	25-40
2.36	1395.0	7833	78.33	21.67	15-30
0.6	780.0	8613	86.13	13.87	8.0-22.0
0.075	890.0	9503	95.03	4.97	0-8
Pan	497.0	10000			
Total	10000.0				

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CONSULTANTS

Name of Work	:	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Client	:	Bruhat Bengaluru Mahanagara Palike
Consultant	:	TEJUS CONSULTANTS, BANGALORE
Contractor	:	M/S Benaka Developers and Projects Pvt Ltd
Date of Testing	:	09-11-2021
Type of Mix	:	WMM
Sample I/D	:	WMM 2

GRADATION FOR WMM
(As per MORT&H 400-11)

Sample Location:	Tirumenahalli Main Road	Date of Sampling:	08-11-2021
		Date of testing:	09-11-2021
Type of material & Purpose:	WMM	Oven Dry Wt.(gms):	10000.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
53	0	0	0.00	100.00	100.00
45	388	388	3.88	96.12	95-100
22.4	2385	2773	27.73	72.27	60-80
11.2	2492	5265	52.65	47.35	40-60
4.75	1452.0	6717	67.17	32.83	25-40
2.36	790.0	7507	75.07	24.93	15-30
0.6	863.0	8370	83.70	16.30	8.0-22.0
0.075	990.0	9360	93.60	6.40	0-8
Pan	640.0	10000			
Total	10000.0				

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Consultant's Representative

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Project	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)

	Date:	**10-11-2021**
Layer no. or level	WMM I layer	
Depth of hole	200mm	
Field density:	**1**	**2**
Chainage	**Tirumenahalli Main Road at Ch:243.00**	**Tirumenahalli Main Road at Ch:315.00**
Wt. of wet material from hole (Ww) gms.	5990	5979
Wt. of sand+cylinder before pouring (w1) gms.	15000	15000
Wt. of sand+cylinder after pouring (w2) gms.	10585	10590
Wt. of sand in hole+ cone (w3) gms.	4415	4410
Wt. of cone gms.	1080	1080
Wt. of sand gms.	3335	3330
Bulk density of sand (γs)gm/cc	1.32	1.32
Bulk density of material(i.e. wt. of the wet material) (γb)=(Ww/w4*(γs))gm/cc	2.37	2.37
Moisture meter reading(moisture content)	6.30	6.30
Result		
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.23	2.23
MDD	2.27	2.27
OMC	6.10%	6.10%
% compaction obtained	98.25	98.22
% compaction required	98%	98%

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Project	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)

Date of Testing	10-11-2021	
Layer no. or level	WMM I layer	
Depth of hole	200mm	
Field density:	1	2
Chainage	**Tirumenahalli Main Road at Ch:57.00**	**Tirumenahalli Main Road at Ch:162.00**
Wt. of wet material from hole (Ww) gms.	5992	5984
Wt. of sand+cylinder before pouring (w1) gms.	15000	15000
Wt. of sand+cylinder after pouring (w2) gms.	10591	10593
Wt. of sand in hole+ cone (w3) gms.	4409	4407
Wt. of cone gms.	1080	1080
Wt. of sand gms.	3329	3327
Bulk density of sand (γs)gm/cc	1.32	1.32
Bulk density of material(i.e. wt. of the wet material) (γb)=(Ww/w4*(γs))gm/cc	2.38	2.37
Moisture meter reading(moisture content)	6.20	6.40
Result		
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.24	2.23
MDD	2.27	2.27
OMC	6.10%	6.10%
% compaction obtained	98.56	98.30
% compaction required	98%	98%

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Project	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

AGGREGATE IMPACT VALUE (IS: 2386 Part - 4)

Proposed Use	WMM	Date of Sampling	12-11-2021
Sample Location	Tirumenahalli Main Road	Date of Testing	13-11-2021

Sl. No.	Description		Test No. 1	Test No. 2	Test No. 3	Spec Limit (%)
1	Wt. of stone pieces (dry) passing IS Sieve 12.5mm but retained in IS sieve 10mm (gm)	(Wa)	390.00	368.00	381.00	
2	Wt. of the fraction retained in IS sieve 2.36mm after the impact test (gm)	(Wb)	292.00	274.00	283.00	
3	Wt. of the fraction passed in IS sieve 2.36mm after the impact test (gm)	(Wc)	98.00	94.00	98.00	
4	Aggregate Impact Value (%)	(Wc/Wa)*100	25.13	25.54	25.72	
5	Average Aggregate impact value	(%)	25.46			Max - 30 %

Remarks : ✓ Satisfactory / Not Satisfactory

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Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

FLAKINESS AND ELONGATION INDICES (IS 2386, PART I)

Type of Material	WMM	**Proposed Use**	WMM
Sample Location	Tirumenahalli Main Road	**Date of Sampling**	12-11-2021
		Date of Testing	13-11-2021

Size of aggregate		Flakiness Index		Elongation Index	
Passing through IS sieve, mm	Retained on IS sieve, mm	Total wt. of aggregate retained on sieves (A) gms.	Wt. of aggregate passing from Flakiness gauge (B) gms	Wt. of aggregate retained on Flakiness gauge (C) gms	Wt. of aggregate retained on Elongation gauge after retained on Flakiness gauge(D)gms
63.0	50.0	0	0	0	0
50.0	40.0	0	0	0	0
40.0	31.5	0	0	0	0
31.5	25.0	0	0	0	0
25.0	20.0	0	0	0	0
20.0	16.0	632	82	535	76
16.0	12.5	1139	117	1008	129
12.5	10.0	760	69	740	54
10.0	6.3	615	52	570	48
Total		**3146**	**320**	**2853**	**307**

Note: Minimum 200 Pcs should be taken on each fraction of test

Flakiness Index(%):	10.17
Elongation Index(%):	10.76
Combined FI+EL (%)	20.93

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CONSULTANTS

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Client	:	Bruhat Bengaluru Mahanagara Palike
Consultant	:	TEJUS CONSULTANTS, BANGALORE
Contractor	:	M/S Benaka Developers and Projects Pvt Ltd
Date of Testing	:	13-11-2021
Type of Mix	:	WMM
Sample I/D	:	WMM 3

GRADATION FOR WMM
(As per MORT&H 400-11)

Sample Location:	Tirumenahalli Main Road	Date of Sampling:	12-11-2021
		Date of testing:	13-11-2021
Type of material & Purpose:	WMM	Oven Dry Wt.(gms):	10000.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
53	0	0	0.00	100.00	100.00
45	378	378	3.78	96.22	95-100
22.4	2418	2796	27.96	72.04	60-80
11.2	2463	5259	52.59	47.41	40-60
4.75	1492.0	6751	67.51	32.49	25-40
2.36	795.0	7546	75.46	24.54	15-30
0.6	847.0	8393	83.93	16.07	8.0-22.0
0.075	980.0	9373	93.73	6.27	0-8
Pan	627.0	10000			
Total	10000.0				

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Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)

	Date:	**17-11-2021**
Layer no. or level	WMM I layer	
Depth of hole	200mm	
Field density:	**1**	**2**
Chainage	**Tirumenahalli Main Road at Ch:422.00**	**Tirumenahalli Main Road at Ch:543.00**
Wt. of wet material from hole (Ww) gms.	5987	5969
Wt. of sand+cylinder before pouring (w1) gms.	15000	15000
Wt. of sand+cylinder after pouring (w2) gms.	10595	10595
Wt. of sand in hole+ cone (w3) gms.	4405	4405
Wt. of cone gms.	1080	1080
Wt. of sand gms.	3325	3325
Bulk density of sand (ys)gm/cc	1.32	1.32
Bulk density of material(i.e. wt. of the wet material) (yb)=(Ww/w4*(ys))gm/cc	2.38	2.37
Moisture meter reading(moisture content)	6.40	6.20
Result		
FDD(Wt.of the dry material)=(100yb/100+mc)gm/cc	2.23	2.23
MDD	2.27	2.27
OMC	6.10%	6.10%
% compaction obtained	98.41	98.30
% compaction required	98%	98%

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Consultant's Representative

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Project	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)

	Date: 17-11-2021	
Layer no. or level	WMM I layer	
Depth of hole	200mm	
Field density:	1	2
Chainage	**Tirumenahalli Main Road at Ch:626.00**	**Tirumenahalli Main Road at Ch:739.00**
Wt. of wet material from hole (Ww) gms.	5993	5978
Wt. of sand+cylinder before pouring (w1) gms.	15000	15000
Wt. of sand+cylinder after pouring (w2) gms.	10582	10589
Wt. of sand in hole+ cone (w3) gms.	4418	4411
Wt. of cone gms.	1080	1080
Wt. of sand gms.	3338	3331
Bulk density of sand (γs)gm/cc	1.32	1.32
Bulk density of material(i.e. wt. of the wet material) (γb)=(Ww/w4*(γs))gm/cc	2.37	2.37
Moisture meter reading(moisture content)	6.30	6.30
Result		
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.23	2.23
MDD	2.27	2.27
OMC	6.10%	6.10%
% compaction obtained	98.21	98.17
% compaction required	98%	98%

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TEST REPORT

Clients	Bruhath Bangalore Mahanagara Palike
Project	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Consultants	TEJUS CONSULTANTS Basaveshwar Nagar Bangalore
Contractor	M/S Benaka Developers and Projects Pvt Ltd
Total Weight in gm:	3000

SIEVE ANALYSIS

Type of Material	40 mm down size	**Proposed Use**	PCC
Sample Location	Tirumenahalli Main Road(For SSM)	**Date of Sampling**	05-12-2021
		Date of Testing	06-12-2021

IS Sieve Size	Weight Retained in gm	Cum. Weight Retained in gm	Cumulative Weight Retained in %	Cumulative Weight Passing in %	Specific Limits as per IS 383-1970 (RA-2007) % of Passing For Graded Aggregate of Nominal Size
80.00mm	0	0	0.00	100.00	100
63.00mm	0	0	0.00	100.00	-
40.00mm	78	78	2.60	97.40	95-100
20.00mm	1375	1453	48.43	51.57	30-70
10.00mm	966	2419	80.63	19.37	10-35
4.75mm	476	2895	96.50	3.50	0-5
Pan	105	3000	100.00	0.00	

Remarks : ✓ Satisfactory / Not Satisfactory

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TEST REPORT	
Clients	BRUHAT BENGALORE MAHANAGARA PALIKE
Project	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Consultants	TEJUS CONSULTANTS Basaveshwar Nagar Bangalore
Contractor	M/S Benaka Developers and Projects Pvt Ltd

SPECIFIC GRAVITY AND WATER ABSORPTION

FINE AGGREGATE (IS-2386-PART-3)

Type of Material	M sand	Proposed Use	PCC
Location/Source	Tirumenahalli Main Road(For SSM)	Date of Sampling	05-12-2021
Period of Soaking	24 hours	Date of Testing	06-12-2021

Sl. No.	Test Property		TRIAL - 1	TRIAL - 2	TRIAL - 3	
A	Weight of sturated surface dry sample gm.		655	662	645	
B	Weight of oven - dry sample gm.		647	654	637	
C	Weight of Pycnometer Filled with water gm		1275	1275	1275	
D	Weight of Pycnometer + sample + water gm		1686	1691	1680	
E	Bulk specific gravity	$\frac{B}{(C+A-D)}$	2.652	2.659	2.654	2.655
G	Absorption (%)	$\frac{(A-B)*100}{B}$	1.236	1.223	1.256	1.239

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Test Report on Cement

Project	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bangalore Mahanagar Palike
Consultant	TEJUS CONSULTANTS
Contractor	M/S Benaka Developers and Projects Pvt Ltd
Sample ID	Cement (ACC Cement) OPC 43 Grade
Date of Sample Tested	06-12-2021
Sample Supplied By	Agency

Sl.No.	Descriptions	Test Method as per IS	Test Result	Requirements as per IS: 12269-1987
1	a) Initial Setting Time	IS-4031 (Part-5)	103 Minutes	Not Less than 30 Minutes
	b) Final Setting Time	IS-4031 (Part-5)	438 Minutes	Not More than 600 Minutes
2	Soundness	IS-4031 (Part-3) By the Le-Chatelier method	6 mm	Not More than 10 mm
3	Standard Consistency	IS-4031 (Part-4)	29.00%	25 % to 35

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TEST REPORT	
Clients	Bruhat Bangalore Mahanagara Palike
Project	Improvements to ronds and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Consultants	Tejus Consultants, Bangalore
Contractor	M/S Benaka Developers and Projects Pvt Ltd

SIEVE ANALYSIS

Total Weight:	3000 gms		
Type of Material	M sand	Proposed Use	PCC
Sample Location	Tirumenahalli Main Road(For SSM)	Date of Sampling	06-12-2021
		Date of Testing	06-12-2021

IS Sieve Size	Weight Retained	Cum. Weight Retained	Cum. % Retained	Cum. % Passing	Spec. Limit (%) Passing (Zone-II)
10.00 mm	0	0	0	100.00	100
4.75 mm	217	217	7.23	92.77	90 - 100
2.36 mm	322	539	17.97	82.03	75 - 100
1.18 mm	412	951	31.70	68.30	55 - 90
600 mm	488	1439	47.97	52.03	35 -59
0.300 mm	754	2193	73.10	26.90	8-30
0.150 mm	622	2815	93.83	6.17	0 - 10
Pan	185	3000			-

Remarks : ✓ Satisfactory / Not Satisfactory

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TEST REPORT

Clients	Bruhat Bangalore Mahanagara Palike
Project	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Consultants	TEJUS CONSULTANTS
Contractor	M/S Benaka Developers and Projects Pvt Ltd
Total Weight:	10000 gms

SIEVE ANALYSIS

Type of Material	**12.5 mm down size**	**Proposed Use**	Coping Concrete
Sample Location	Tirumenahalli Main Road(For SSM)	**Date of Sampling**	06-12-2021
		Date of Testing	07-12-2021

IS Sieve Size (in mm)	Weight Retained	Cum. Weight Retained	Cum. % Retained	Cum. % Passing	Spec. Limit (%) Passing
20.0	0	0	0	100	100
12.5	536	536	5.36	94.64	90-100
10.0	4562	5098	50.98	49.02	40-85
4.75	4336	9434	94.34	5.66	0-10
Pan	566	10000			

Remarks : ✓ Satisfactory / Not Satisfactory

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TEST REPORT

TEJUS CONSULTANTS

Clients	Bruhat Bangalore Mahanagara Palike
Project	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Consultants	TEJUS CONSULTANTS Basaveshwar Nagar Bangalore
Contractor	M/S Benaka Developers and Projects Pvt Ltd
Total Weight:	10000 gms

SIEVE ANALYSIS

Type of Material	20 mm down size	**Proposed Use**	Coping Concrete
Sample Location	Tirumenahalli Main Road(For SSM)	**Date of Sampling**	06-12-2021
		Date of Testing	07-12-2021

IS Sieve Size	Weight Retained	Cum. Weight Retained	Cum. % Retained	Cum. % Passing	Spec. Limit (%) Passing
40.00 mm	0	0	0	100	100
20.00 mm	285	285	2.85	97.15	95 - 100
10.00 mm	4629	4914	49.14	50.86	25 - 55
4.75 mm	4364	9278	92.78	7.22	0 - 10
Pan	722	10000			

Remarks : Satisfactory / Not Satisfactory

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TEST REPORT

Clients	BRUHAT BENGALORE MAHANAGARA PALIKE
Project	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Consultants	TEJUS CONSULTANTS Basaveshwar Nagar Bangalore
Contractor	M/S Benaka Developers and Projects Pvt Ltd

SPECIFIC GRAVITY AND WATER ABSORPTION

FINE AGGREGATE (IS-2386-PART-3)

Type of Material	M sand	**Proposed Use**	Coping concrete
Location/Source	Tirumenahalli Main Road(For SSM)	**Date of Sampling**	06-12-2021
Period of Soaking	24 hours	**Date of Testing**	07-12-2021

Sl. No.	Test Property	TRIAL - 1	TRIAL - 2	TRIAL - 3	
A	Weight of sturated surface dry sample gm.	643	665	638	
B	Weight of oven - dry sample gm.	635	656	629	
C	Weight of Pycnometer Filled with water gm	1275	1275	1275	
D	Weight of Pycnometer + sample + water gm	1679	1693	1676	
E	Bulk specific gravity $\frac{B}{(C+A-D)}$	2.657	2.656	2.654	2.656
G	Absorption (%) $\frac{(A-B)*100}{B}$	1.260	1.372	1.431	1.354

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Test Report on Cement

TEJUS CONSULTANTS

Project	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bangalore Mahanagar Palike
Consultant	TEJUS CONSULTANTS
Contractor	M/S Benaka Developers and Projects Pvt Ltd
Sample ID	Cement (ACC Cement) OPC 43 Grade
Date of Sample Tested	07-12-2021
Sample Supplied By	Agency

Sl.No.	Descriptions	Test Method as per IS	Test Result	Requirements as per IS: 12269-1987
1	a) Initial Setting Time	IS-4031 (Part-5)	98 Minutes	Not Less than 30 Minutes
	b) Final Setting Time	IS-4031 (Part-5)	469 Minutes	Not More than 600 Minutes
2	Soundness	IS-4031 (Part-3) By the Le-Chatelier method	5mm	Not More than 10 mm
3	Standard Consistency	IS-4031 (Part-4)	27.00%	25 % to 35

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TEST REPORT

Clients	Bruhat Bangalore Mahanagara Palike
Project	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
Consultants	Tejus Consultants, Bangalore
Contractor	M/S Bonaka Developers and Projects Pvt Ltd

SIEVE ANALYSIS

Total Weight:	3000 gms		
Type of Material	M sand	Proposed Use	Coping concrete
Sample Location	Tirumenahalli Main Road(For SSM)	Date of Sampling	07-12-2021
		Date of Testing	07-12-2021

IS Sieve Size	Weight Retained	Cum. Weight Retained	Cum. % Retained	Cum. % Passing	Spec. Limit (%) Passing (Zone-II)
10.00 mm	0	0	0	100.00	100
4.75 mm	209	209	6.97	93.03	90 - 100
2.36 mm	332	541	18.03	81.97	75 - 100
1.18 mm	421	962	32.07	67.93	55 - 90
0.600 mm	490	1452	48.40	51.60	35 -59
0.300 mm	712	2164	72.13	27.87	8-30
0.150 mm	644	2808	93.60	6.40	0 - 10
Pan	192	3000			-

Remarks : Satisfactory / Not Satisfactory

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PRECAST SLAB (CORE) TEST REPORT

Client	:	Bruhat Bangalore Mahanagara Palike
Contractor	:	Benaka Developers & Project Pvt.Ltd.
Name of Work	:	Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division
No.of Sample Tested	:	3
Date of Testing	:	11-12-2021
Technical Reference	:	IS:516-1959 (Reaffirmed 1999), SP-24:1983.
Grade of Concrete	:	M15 ,250mm Thick

Sl. No.	Dia of Core D (mm)	Height of Core H (mm)	Core Wt (Kg)	Density of Core (kg / m^3)	H / D	Correction factor (Based on H/D)	Failure Load (KN)	Core Strength (N/mm^2)	Correction Factor for the Dia. (Strength of the Core x 1.08)	Corrected Cylinder Compressive Strength (N/mm^2)	Equivalent Cube Compressive Strength (N/mm^2)
1	100.00	180.00	3.566	2522.43	1.80	0.960	125.00	15.92	17.19	16.50	20.63
2	100.00	180.00	3.388	2396.52	1.80	0.960	122.00	15.53	16.78	16.11	20.13
3	100.00	180.00	3.456	2444.62	1.80	0.960	120.00	15.28	16.50	15.84	19.80

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BRUHAT BANGALORE MAHANAGARA PALIKE
BYTARAYANPURA DIVISION

Name of Work: Package 2 Consists of 3 Works of Rs.1100.00 Lakhs

2. Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division.

TEST REPORTS

SECOND & PART BILL

TEJUS CONSULTANTS
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1st Stage, Basaveshwaranagar
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email: tejusconsultants@gmail.com

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Name of Work	:	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	:	Bruhat Bengaluru Mahanagara Palike
Consultant	:	TEJUS CONSULTANTS, BANGALORE
Contractor	:	M/S Benaka Developers and Projects Pvt Ltd
Date of Testing	:	04-09-2021
Type of Mix	:	WMM
Sample I/D	:	WMM 1

GRADATION FOR WMM
(As per MORT&H 400-11)

Sample Location:	Balajikrupa Layout	Date of Sampling:	03-09-2021
		Date of testing:	04-09-2021
Type of material & Purpose:	WMM	Oven Dry Wt.(gms):	10000.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
53	0	0	0.00	100.00	100.00
45	366	370	3.70	96.30	95-100
22.4	1792	2162	21.62	78.38	60-80
11.2	2264	4426	44.26	55.74	40-60
4.75	2015.0	6441	64.41	35.59	25-40
2.36	1390.0	7831	78.31	21.69	15-30
0.6	778.0	8609	86.09	13.91	8.0-22.0
0.075	882.0	9491	94.91	5.09	0-8
Pan	509.0	10000			
Total	10000.0				

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CONSULTANTS

Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

AGGREGATE IMPACT VALUE (IS: 2386 Part - 4)

Proposed Use	WMM	Date of Sampling	03-09-2021
Sample Location	Balajikrupa Layout	Date of Testing	04-09-2021

Sl. No.	Description		Test No. 1	Test No. 2	Test No. 3	Spec Limit (%)
1	Wt. of stone pieces (dry) passing IS Sieve 12.5mm but retained in IS sieve 10mm (gm)	(Wa)	384.00	352.00	348.00	
2	Wt. of the fraction retained in IS sieve 2.36mm after the impact test (gm)	(Wb)	290.00	266.00	262.00	
3	Wt. of the fraction passed in IS sieve 2.36mm after the impact test (gm)	(Wc)	94.00	86.00	86.00	
4	Aggregate Impact Value (%)	(Wc/Wa)*100	24.48	24.43	24.71	
5	Average Aggregate impact value	(%)	24.54			Max - 30 %

Remarks : Satisfactory / Not Satisfactory

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4. The material used in the site satisfied the standard of MORTH's 5th revision and hence can be used in the work.

TEJUS CONSULTANTS

Consultant's Representative

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CONSULTANTS

Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

FLAKINESS AND ELONGATION INDICES (IS 2386, PART 1)

Type of Material	WMM	**Proposed Use**	**WMM**
Sample Location	Balajikrupa Layout	**Date of Sampling**	**03-09-2021**
		Date of Testing	**04-09-2021**

Size of aggregate		**Flakiness Index**		**Elongation Index**	
Passing through IS sieve, mm	**Retained on IS sieve, mm**	**Total wt. of aggregate retained on sieves (A) gms.**	**Wt. of aggregate passing from Flakiness gauge (B) gms**	**Wt. of aggregate retained on Flakiness gauge (C) gms**	**Wt. of aggregate retained on Elongation gauge after retained on Flakiness gauge(D)gms**
63.0	50.0	0	0	0	0
50.0	40.0	0	0	0	0
40.0	31.5	0	0	0	0
31.5	25.0	0	0	0	0
25.0	20.0	0	0	0	0
20.0	16.0	652	75	535	72
16.0	12.5	1132	122	980	108
12.5	10.0	770	59	730	56
10.0	6.3	615	63	549	50
Total		**3169**	**319**	**2794**	**286**

Note: Minimum 200 Pcs should be taken on each fraction of test

Flakiness Index(%):	10.07
Elongation Index(%):	10.24
Combined FI+EL (%)	20.30

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Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)

	Date:	**08-09-2021**
Layer no. or level	WMM I layer	
Depth of hole	200mm	
Field density:	**1**	**2**
Chainage	**Balajikrupa Layout 3rd cross at Ch:128**	**Balajikrupa Layout 3rd cross at Ch:235**
Wt. of wet material from hole (Ww) gms.	5986	5967
Wt. of sand+cylinder before pouring (w1) gms.	15000	15000
Wt. of sand+cylinder after pouring (w2) gms.	10594	10594
Wt. of sand in hole+ cone (w3) gms.	4406	4406
Wt. of cone gms.	1080	1080
Wt. of sand gms.	3326	3326
Bulk density of sand (ys)gm/cc	1.32	1.32
Bulk density of material(i.e. wt. of the wet material) (yb)=(Ww/w4*(ys))gm/cc	2.38	2.37
Moisture meter reading(moisture content)	6.30	6.30
Result		
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.23	2.23
MDD	2.27	2.27
OMC	6.10%	6.10%
% compaction obtained	98.45	98.14
% compaction required	98%	98%

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Project	Improvements to roads and drains at Agrahara Junction Surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)

	Date:	**09-09-2021**
Layer no. or level	WMM I layer	
Depth of hole	200mm	
Field density:	**1**	**2**
Chainage	**Balajikrupa Layout 4th cross at Ch:45**	**Balajikrupa Layout 4th cross at Ch:216**
Wt. of wet material from hole (Ww) gms.	5983	5965
Wt. of sand+cylinder before pouring (w1) gms.	15000	15000
Wt. of sand+cylinder after pouring (w2) gms.	10595	10596
Wt. of sand in hole+ cone (w3) gms.	4405	4404
Wt. of cone gms.	1080	1080
Wt. of sand gms.	3325	3324
Bulk density of sand (γs)gm/cc	1.32	1.32
Bulk density of material(i.e. wt. of the wet material) (γb)=(Ww/w4*(γs))gm/cc	2.38	2.37
Moisture meter reading(moisture content)	6.40	6.20
Result		
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.23	2.23
MDD	2.27	2.27
OMC	6.10%	6.10%
% compaction obtained	98.34	98.26
% compaction required	98%	98%

Note:

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Name of Work	:	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	:	Bruhat Bengaluru Mahanagara Palike
Consultant	:	TEJUS CONSULTANTS, BANGALORE
Contractor	:	M/S Benaka Developers and Projects Pvt Ltd
Date of Testing	:	14-09-2021
Type of Mix	:	WMM
Sample I/D	:	WMM 2

GRADATION FOR WMM
(As per MORT&H 400-11)

Sample Location:	7th Crs Rd BalajiKrupa	Date of Sampling:	13-09-2021
		Date of testing:	14-09-2021
Type of material & Purpose:	WMM	Oven Dry Wt.(gms):	10000.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
53	0	0	0.00	100.00	100.00
45	392	392	3.92	96.08	95-100
22.4	2380	2772	27.72	72.28	60-80
11.2	2480	5252	52.52	47.48	40-60
4.75	1453.0	6705	67.05	32.95	25-40
2.36	790.0	7495	74.95	25.05	15-30
0.6	852.0	8347	83.47	16.53	8.0-22.0
0.075	985.0	9332	93.32	6.68	0-8
Pan	668.0	10000			
Total	10000.0				

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Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

FLAKINESS AND ELONGATION INDICES (IS 2386, PART 1)

Type of Material		WMM		**Proposed Use**	**WMM**
Sample Location		7th Crs Rd BalajiKrupa		**Date of Sampling**	13-09-2021
				Date of Testing	14-09-2021
Size of aggregate		**Flakiness Index**		**Elongation Index**	
Passing through IS sieve, mm	**Retained on IS sieve, mm**	**Total wt. of aggregate retained on sieves (A) gms.**	**Wt. of aggregate passing from Flakiness gauge (B) gms**	**Wt. of aggregate retained on Flakiness gauge (C) gms**	**Wt. of aggregate retained on Elongation gauge after retained on Flakiness gauge(D)gms**
63.0	50.0	0	0	0	0
50.0	40.0	0	0	0	0
40.0	31.5	0	0	0	0
31.5	25.0	0	0	0	0
25.0	20.0	0	0	0	0
20.0	16.0	632	80	522	72
16.0	12.5	1125	122	1012	126
12.5	10.0	760	70	732	52
10.0	6.3	620	53	570	49
Total		**3137**	**325**	**2836**	**299**

Note: Minimum 200 Pcs should be taken on each fraction of test

Flakiness Index(%):	10.36
Elongation Index(%):	10.54
Combined FI+EL (%)	20.90

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Project	Improvements to roads and drains at Agrahara and surrounding areas in Ward No 05 Byatarayanapura sub division	
Client	Bruhat Bengaluru Mahanagara Palike	
Consultant	TEJUS CONSULTANTS, BANGALORE	
Contractor	M/S Benaka Developers and Projects Pvt Ltd	
Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)		
	Date:	**17-09-2021**
Layer no. or level	WMM I layer	
Depth of hole	200mm	
Field density:	**1**	**2**
Chainage	**Balajikrupa Layout 6th cross at Ch:67**	**Balajikrupa Layout 6th cross at Ch:183**
Wt. of wet material from hole (Ww) gms.	5983	5976
Wt. of sand+cylinder before pouring (w1) gms.	15000	15000
Wt. of sand+cylinder after pouring (w2) gms.	10590	10597
Wt. of sand in hole+ cone (w3) gms.	4410	4403
Wt. of cone gms.	1080	1080
Wt. of sand gms.	3330	3323
Bulk density of sand (ys)gm/cc	1.32	1.32
Bulk density of material(i.e. wt. of the wet material) (γb)=(Ww/w4*(ys))gm/cc	2.37	2.37
Moisture meter reading(moisture content)	6.30	6.30
Result		
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.23	2.23
MDD	2.27	2.27
OMC	6.10%	6.10%
% compaction obtained	98.29	98.38
% compaction required	98%	98%

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Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

AGGREGATE IMPACT VALUE (IS: 2386 Part - 4)

Proposed Use	WMM	Date of Sampling	17-09-2021
Sample Location	Agrahara Layout Roads	Date of Testing	18-09-2021

Sl. No.	Description		Test No. 1	Test No. 2	Test No. 3	Spec Limit (%)
1	Wt. of stone pieces (dry) passing IS Sieve 12.5mm but retained in IS sieve 10mm (gm)	(Wa)	392.00	371.00	385.00	
2	Wt. of the fraction retained in IS sieve 2.36mm after the impact test (gm)	(Wb)	295.00	281.00	290.00	
3	Wt. of the fraction passed in IS sieve 2.36mm after the impact test (gm)	(Wc)	97.00	90.00	95.00	
4	Aggregate Impact Value (%)	(Wc/Wa)*100	24.74	24.26	24.68	
5	Average Aggregate impact value	(%)	24.56			Max - 30 %

Remarks : Satisfactory / Not Satisfactory

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Client	:	Bruhat Bengaluru Mahanagara Palike
Consultant	:	TEJUS CONSULTANTS, BANGALORE
Contractor	:	M/S Benaka Developers and Projects Pvt Ltd
Date of Testing	:	18-09-2021
Type of Mix	:	WMM
Sample I/D	:	WMM 3

GRADATION FOR WMM
(As per MORT&H 400-11)

Sample Location:	Agrahara Layout Roads	Date of Sampling:	17-09-2021
		Date of testing:	18-09-2021
Type of material & Purpose:	WMM	Oven Dry Wt.(gms):	10000.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
53	0	0	0.00	100.00	100.00
45	366	366	3.66	96.34	95-100
22.4	2422	2788	27.88	72.12	60-80
11.2	2432	5220	52.20	47.80	40-60
4.75	1485.0	6705	67.05	32.95	25-40
2.36	780.0	7485	74.85	25.15	15-30
0.6	845.0	8330	83.30	16.70	8.0-22.0
0.075	980.0	9310	93.10	6.90	0-8
Pan	690.0	10000			
Total	10000.0				

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Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

FLAKINESS AND ELONGATION INDICES (IS 2386, PART I)

Type of Material	WMM	**Proposed Use**	WMM
Sample Location	Agrahara Layout Roads	**Date of Sampling**	17-09-2021
		Date of Testing	18-09-2021

Size of aggregate		Flakiness Index		Elongation Index	
Passing through IS sieve, mm	Retained on IS sieve, mm	Total wt. of aggregate retained on sieves (A) gms.	Wt. of aggregate passing from Flakiness gauge (B) gms	Wt. of aggregate retained on Flakiness gauge (C) gms	Wt. of aggregate retained on Elongation gauge after retained on Flakiness gauge(D)gms
63.0	50.0	0	0	0	0
50.0	40.0	0	0	0	0
40.0	31.5	0	0	0	0
31.5	25.0	0	0	0	0
25.0	20.0	0	0	0	0
20.0	16.0	622	82	520	72
16.0	12.5	1135	120	960	115
12.5	10.0	770	55	740	50
10.0	6.3	615	62	562	45
Total		**3142**	**319**	**2782**	**282**

Note: Minimum 200 Pcs should be taken on each fraction of test

Flakiness Index(%):	10.15
Elongation Index(%):	10.14
Combined FI+EL (%)	20.29

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Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division	
Client	Bruhat Bengaluru Mahanagara Palike	
Consultant	TEJUS CONSULTANTS, BANGALORE	
Contractor	M/S Benaka Developers and Projects Pvt Ltd	
Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)		
Date of Testing	**22-09-2021**	
Layer no. or level	WMM I layer	
Depth of hole	200mm	
Field density:	**1**	**2**
Chainage	**Agrahara Layout Main Road at Ch:52**	**Agrahara Layout Main Road at Ch:112**
Wt. of wet material from hole (Ww) gms.	5990	5982
Wt. of sand+cylinder before pouring (w1) gms.	15000	15000
Wt. of sand+cylinder after pouring (w2) gms.	10592	10594
Wt. of sand in hole+ cone (w3) gms.	4408	4406
Wt. of cone gms.	1080	1080
Wt. of sand gms.	3328	3326
Bulk density of sand (ys)gm/cc	1.32	1.32
Bulk density of material(i.e. wt. of the wet material) (yb)=(Ww/w4*(ys))gm/cc	2.38	2.37
Moisture meter reading(moisture content)	6.20	6.40
Result		
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.24	2.23
MDD	2.27	2.27
OMC	6.10%	6.10%
% compaction obtained	98.55	98.29
% compaction required	98%	98%

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Consultant's Representative

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Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

FLAKINESS AND ELONGATION INDICES (IS 2386, PART 1)

Type of Material	WMM	**Proposed Use**	**WMM**
Sample Location	Balaji Badavane	**Date of Sampling**	**24-09-2021**
		Date of Testing	**25-09-2021**

Size of aggregate		**Flakiness Index**		**Elongation Index**	
Passing through IS sieve, mm	**Retained on IS sieve, mm**	**Total wt. of aggregate retained on sieves (A) gms.**	**Wt. of aggregate passing from Flakiness gauge (B) gms**	**Wt. of aggregate retained on Flakiness gauge (C) gms**	**Wt. of aggregate retained on Elongation gauge after retained on Flakiness gauge(D)gms**
63.0	50.0	0	0	0	0
50.0	40.0	0	0	0	0
40.0	31.5	0	0	0	0
31.5	25.0	0	0	0	0
25.0	20.0	0	0	0	0
20.0	16.0	605	80	520	72
16.0	12.5	1145	122	975	117
12.5	10.0	770	55	715	59
10.0	6.3	615	58	556	52
Total		**3135**	**315**	**2766**	**300**

Note: Minimum 200 Pcs should be taken on each fraction of test

Flakiness Index(%):	10.05
Elongation Index(%):	10.85
Combined FI+EL (%)	20.89

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Name of Work	:	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	:	Bruhat Bengaluru Mahanagara Palike
Consultant	:	TEJUS CONSULTANTS, BANGALORE
Contractor	:	M/S Benaka Developers and Projects Pvt Ltd
Date of Testing	:	25-09-2021
Type of Mix	:	WMM
Sample I/D	:	WMM 4

GRADATION FOR WMM
(As per MORT&H 400-11)

Sample Location:	Balaji Badavane	Date of Sampling:	24-09-2021
		Date of testing:	25-09-2021
Type of material & Purpose:	WMM	Oven Dry Wt.(gms):	10000.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
53	0	0	0.00	100.00	100.00
45	370	370	3.70	96.30	95-100
22.4	2392	2762	27.62	72.38	60-80
11.2	2485	5247	52.47	47.53	40-60
4.75	1585.0	6832	68.32	31.68	25-40
2.36	770.0	7602	76.02	23.98	15-30
0.6	805.0	8407	84.07	15.93	8.0-22.0
0.075	985.0	9392	93.92	6.08	0-8
Pan	608.0	10000			
Total	10000.0				

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Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)

	Date:	**28-09-2021**
Layer no. or level	WMM I layer	
Depth of hole	200mm	
Field density:	**1**	**2**
Chainage	**Agrahara Layout Main Road at Ch:236**	**Agrahara Layout Main Road at Ch:452**
Wt. of wet material from hole (Ww) gms.	5987	5978
Wt. of sand+cylinder before pouring (w1) gms.	15000	15000
Wt. of sand+cylinder after pouring (w2) gms.	10591	10596
Wt. of sand in hole+ cone (w3) gms.	4409	4404
Wt. of cone gms.	1080	1080
Wt. of sand gms.	3329	3324
Bulk density of sand (γs)gm/cc	1.32	1.32
Bulk density of material(i.e. wt. of the wet material) (γb)=(Ww/w4*(γs))gm/cc	2.37	2.37
Moisture meter reading(moisture content)	6.30	6.30
Result		
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.23	2.23
MDD	2.27	2.27
OMC	6.10%	6.10%
% compaction obtained	98.38	98.38
% compaction required	98%	98%

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Name of Work	:	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	:	Bruhat Bengaluru Mahanagara Palike
Consultant	:	TEJUS CONSULTANTS, BANGALORE
Contractor	:	M/S Benaka Developers and Projects Pvt Ltd
Date of Testing	:	29-09-2021
Type of Mix	:	WMM
Sample I/D	:	WMM 5

GRADATION FOR WMM
(As per MORT&H 400-11)

Sample Location:	Agrahara Layout Main Road	Date of Sampling:	28-09-2021
		Date of testing:	29-09-2021
Type of material & Purpose:	WMM	Oven Dry Wt.(gms):	10000.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
53	0	0	0.00	100.00	100.00
45	356	356	3.56	96.44	95-100
22.4	1795	2151	21.51	78.49	60-80
11.2	2265	4416	44.16	55.84	40-60
4.75	2008.0	6424	64.24	35.76	25-40
2.36	1185.0	7609	76.09	23.91	15-30
0.6	802.0	8411	84.11	15.89	8.0-22.0
0.075	902.0	9313	93.13	6.87	0-8
Pan	687.0	10000			
Total	10000.0				

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Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)

	Date:	**29-09-2021**
Layer no. or level	WMM I layer	
Depth of hole	200mm	
Field density:	**1**	**2**
Chainage	**Agrahara Layout Main Road at Ch:685**	**Agrahara Layout Main Road at Ch:802**
Wt. of wet material from hole (Ww) gms.	5968	5986
Wt. of sand+cylinder before pouring (w1) gms.	15000	15000
Wt. of sand+cylinder after pouring (w2) gms.	10597	10595
Wt. of sand in hole+ cone (w3) gms.	4403	4405
Wt. of cone gms.	1080	1080
Wt. of sand gms.	3323	3325
Bulk density of sand (γs)gm/cc	1.32	1.32
Bulk density of material(i.e. wt. of the wet material) (γb)=(Ww/w4*(γs))gm/cc	2.37	2.38
Moisture meter reading(moisture content)	6.40	6.20
Result		
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.23	2.24
MDD	2.27	2.27
OMC	6.10%	6.10%
% compaction obtained	98.15	98.58
% compaction required	98%	98%

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Project	Improvements to roads and drains at Agrahara and surrounding in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)

	Date:	**30-09-2021**
Layer no. or level	WMM I layer	
Depth of hole	200mm	
Field density:	**1**	**2**
Chainage	**4th A in Balajai Badavane at Ch:45**	**4th A in Balajai Badavane at Ch:97**
Wt. of wet material from hole (Ww) gms.	5992	5986
Wt. of sand+cylinder before pouring (w1) gms.	15000	15000
Wt. of sand+cylinder after pouring (w2) gms.	10585	10595
Wt. of sand in hole+ cone (w3) gms.	4415	4405
Wt. of cone gms.	1080	1080
Wt. of sand gms.	3335	3325
Bulk density of sand (ys)gm/cc	1.32	1.32
Bulk density of material(i.e. wt. of the wet material) (yb)=(Ww/w4*(ys))gm/cc	2.37	2.38
Moisture meter reading(moisture content)	6.40	6.20
Result		
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.23	2.24
MDD	2.27	2.27
OMC	6.10%	6.10%
% compaction obtained	98.19	98.58
% compaction required	98%	98%

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Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)

	Date:	**02-10-2021**
Layer no. or level	WMM I layer	
Depth of hole	200mm	
Field density:	**1**	**2**
Chainage	**Agrahara Layout Main Road at Ch:1015**	**Agrahara Layout Main Road at Ch:1102**
Wt. of wet material from hole (Ww) gms.	5993	5978
Wt. of sand+cylinder before pouring (w1) gms.	15000	15000
Wt. of sand+cylinder after pouring (w2) gms.	10597	10590
Wt. of sand in hole+ cone (w3) gms.	4403	4410
Wt. of cone gms.	1080	1080
Wt. of sand gms.	3323	3330
Bulk density of sand (ys)gm/cc	1.32	1.32
Bulk density of material(i.e. wt. of the wet material) (yb)=(Ww/w4*(ys))gm/cc	2.38	2.37
Moisture meter reading(moisture content)	6.30	6.30
Result		
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.24	2.23
MDD	2.27	2.27
OMC	6.10%	6.10%
% compaction obtained	98.66	98.20
% compaction required	98%	98%

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Name of Work	:	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	:	Bruhat Bengaluru Mahanagara Palike
Consultant	:	TEJUS CONSULTANTS Basaveshwar Nagar Bangalore
Contractor	:	M/S Benaka Developers and Projects Pvt Ltd
Date of Testing	:	08-10-2021
Type of Mix	:	WMM
Sample I/D	:	WMM 6

GRADATION FOR WMM
(As per MORT&H 400-11)

Sample Location:	Manjunatha Layout rd	Date of Sampling:	07-10-2021
		Date of testing:	08-10-2021
Type of material & Purpose:	WMM	Oven Dry Wt.(gms):	10000.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
53	0	0	0.00	100.00	100.00
45	379	379	3.79	96.21	95-100
22.4	1782	2161	21.61	78.39	60-80
11.2	2564	4725	47.25	52.75	40-60
4.75	2018.0	6743	67.43	32.57	25-40
2.36	790.0	7533	75.33	24.67	15-30
0.6	825.0	8358	83.58	16.42	8.0-22.0
0.075	992.0	9350	93.50	6.50	0-8
Pan	650.0	10000			
Total	10000.0				

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Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

FLAKINESS AND ELONGATION INDICES (IS 2386, PART 1)

Type of Material	WMM	**Proposed Use**	WMM
Sample Location	Manjunatha Layout rd	**Date of Sampling**	07-10-2021
		Date of Testing	08-10-2021

Size of aggregate		Flakiness Index		Elongation Index	
Passing through IS sieve, mm	Retained on IS sieve, mm	Total wt. of aggregate retained on sieves (A) gms.	Wt. of aggregate passing from Flakiness gauge (B) gms	Wt. of aggregate retained on Flakiness gauge (C) gms	Wt. of aggregate retained on Elongation gauge after retained on Flakiness gauge(D)gms
63.0	50.0	0	0	0	0
50.0	40.0	0	0	0	0
40.0	31.5	0	0	0	0
31.5	25.0	0	0	0	0
25.0	20.0	0	0	0	0
20.0	16.0	618	82	520	72
16.0	12.5	1128	112	975	105
12.5	10.0	775	58	720	59
10.0	6.3	618	62	562	45
Total		**3139**	**314**	**2777**	**281**

Note: Minimum 200 Pcs should be taken on each fraction of test

Flakiness Index(%):	10.00
Elongation Index(%):	10.12
Combined FI+EL (%)	20.12

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Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

AGGREGATE IMPACT VALUE (IS: 2386 Part - 4)

Proposed Use	WMM	Date of Sampling	07-10-2021
Sample Location	Manjunatha Layout rd	Date of Testing	08-10-2021

Sl. No.	Description		Test No. 1	Test No. 2	Test No. 3	Spec Limit (%)
1	Wt. of stone pieces (dry) passing IS Sieve 12.5mm but retained in IS sieve 10mm (gm)	(Wa)	351.00	342.00	367.00	
2	Wt. of the fraction retained in IS sieve 2.36mm after the impact test (gm)	(Wb)	261.00	254.00	272.00	
3	Wt. of the fraction passed in IS sieve 2.36mm after the impact test (gm)	(Wc)	90.00	88.00	95.00	
4	Aggregate Impact Value (%)	(Wc/Wa)*100	25.64	25.73	25.89	
5	Average Aggregate impact value	(%)	25.75			Max - 30 %

Remarks : ✓ Satisfactory / Not Satisfactory

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Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)

	Date:	**11-10-2021**
Layer no. or level	WMM I layer	
Depth of hole	200mm	
Field density:	**1**	**2**
Chainage	**Balajikrupa Layout 1st cross at Ch:86**	**Balajikrupa Layout 1st cross at Ch:170**
Wt. of wet material from hole (Ww) gms.	5987	5991
Wt. of sand+cylinder before pouring (w1) gms.	15000	15000
Wt. of sand+cylinder after pouring (w2) gms.	10590	10595
Wt. of sand in hole+ cone (w3) gms.	4410	4405
Wt. of cone gms.	1080	1080
Wt. of sand gms.	3330	3325
Bulk density of sand (γs)gm/cc	1.32	1.32
Bulk density of material(i.e. wt. of the wet material) (γb)=(Ww/w4*(γs))gm/cc	2.37	2.38
Moisture meter reading(moisture content)	6.40	6.20
Result		
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.23	2.24
MDD	2.27	2.27
OMC	6.10%	6.10%
% compaction obtained	98.26	98.66
% compaction required	98%	98%

Note:
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3. Any Query regarding the report must be reported reported within 15days from the date of testing.
4.The material used in the site satisfied the standard of MORTH's 5th revision and hence can be used in the work.

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ಬ್ಯಾಟರಾಯನಪುರ ಉಪ ವಿಭಾಗ
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Project	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	Bruhat Bengaluru Mahanagara Palike
Consultant	TEJUS CONSULTANTS, BANGALORE
Contractor	M/S Benaka Developers and Projects Pvt Ltd

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)

	Date:	**11-10-2021**
Layer no. or level	WMM I layer	
Depth of hole	200mm	
Field density:	**1**	**2**
Chainage	**Manjunatha Layout rd at Ch:54**	**Manjunatha Layout rd at Ch:102**
Wt. of wet material from hole (Ww) gms.	5979	5985
Wt. of sand+cylinder before pouring (w1) gms.	15000	15000
Wt. of sand+cylinder after pouring (w2) gms.	10596	10595
Wt. of sand in hole+ cone (w3) gms.	4404	4405
Wt. of cone gms.	1080	1080
Wt. of sand gms.	3324	3325
Bulk density of sand (γs)gm/cc	1.32	1.32
Bulk density of material(i.e. wt. of the wet material) (γb)=(Ww/w4*(γs))gm/cc	2.37	2.38
oisture meter reading(moisture content)	6.30	6.30
ılt		
(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.23	2.24
	2.27	2.27
	6.10%	6.10%
›action obtained	98.40	98.47
ıction required	98%	98%

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CONSULTANTS

Name of Work	:	Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division
Client	:	Bruhat Bengaluru Mahanagara Palike
Consultant	:	TEJUS CONSULTANTS, BANGALORE
Contractor	:	M/S Benaka Developers and Projects Pvt Ltd
Date of Testing	:	16-10-2021
Type of Mix	:	WMM
Sample I/D	:	WMM 7

GRADATION FOR WMM
(As per MORT&H 400-11)

Sample Location:	Kuvempu Badavane Mn Rd	Date of Sampling:	15-10-2021
		Date of testing:	16-10-2021
Type of material & Purpose:	WMM	Oven Dry Wt.(gms):	10000.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
53	0	0	0.00	100.00	100.00
45	370	370	3.70	96.30	95-100
22.4	2384	2754	27.54	72.46	60-80
11.2	2490	5244	52.44	47.56	40-60
4.75	1588.0	6832	68.32	31.68	25-40
2.36	765.0	7597	75.97	24.03	15-30
0.6	805.0	8402	84.02	15.98	8.0-22.0
0.075	990.0	9392	93.92	6.08	0-8
Pan	608.0	10000			
Total	10000.0				

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